capacity wagons, and the more general application of automatic brakes. It is of interest to note that the central-buffer coupling produces less waste of energy in trains travelling on a curve. Tests carried out in India on a 5-foot 6-inch line showed that the side-buffered stock required an increase of power of 5·82 per cent. on a 40-chain curve as compared with similar stock, but fitted with central-buffer couplings.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES FOR MAY:—

May 1. 1h. 11m. Venus in conjunction with the Moon (Venus 1° 29′ S.).
4. 11h. Uranus stationary.
5. 6h. Mercury in Inferior conjunction with the Sun.
11. 16h. 53m. Jupiter in conjunction with the Moon (Jupiter 1° 19′ N.).
12. 17h. 57m. Moon eclipsed, partly visible at Greenwich.
18. 9h. 16m. Uranus in conjunction with the Moon (Uranus 4° 43′ N.).
22. 13h. 54m. Mars in conjunction with the Moon (Mars 2° 19′ N.).
26. 7h. 15m. Saturn in conjunction with the Moon (Saturn 2° 38′ S.).
28. 14h. 28m. Mercury in conjunction with Saturn (Mercury 1° 35′ S.).
29. 14h. 51m. Venus in conjunction with Neptune (Venus 2° 59′ N.).
30. 14h. 57m. Neptune in conjunction with the Moon (Neptune 5° 32′ S.).
30 16h. 50m. Venus in conjunction with the Moon (Venus 2° 35′ S.).

COMETS AS MERELY OPTICAL PHENOMENA.—On a plate accompanying No. 4492 of the *Astronomische Nachrichten* there appear reproductions of fifteen photographs, each of which bears a striking resemblance to one or other of the various cometary forms made familiar to us by photographs of comets. But each of these images was produced by passing luminous rays through various lenses in abnormal positions, and the author, Signor Luigi Armellini, of Tarcento, throws out the suggestion that comets may only be optical phenomena produced by the distortion of solar rays passing through lenticular cosmical masses of meteorites. The author does not discuss the spectroscopic side of the question, and the idea is not novel, but the photographs reproduced are so realistic as to make the note of interest.

THE "ASTRONOMISCHEN JAHRESBERICHTS."—Owing to ill-health, Prof. Berberich has been forced to hand over the editorship of the extremely useful *Astronomischen Jahresberichts*, founded by the late Dr. Wislicenus in 1900, to the Astronomische Rechen-Institut of Berlin. In order that the year-book may not suffer by the change, Dr. Fritz Cohn, director of the Rechen-Institut, asks for the cooperation of astronomers who publish any papers during the year. The section on variable and new stars has been undertaken by Dr. Pračka, Observatorium Nižbo Bohemia, to whom extracts coming under that heading should be sent.

THE INTRINSIC LIGHT AND EFFECTIVE TEMPERATURES OF ALGOL AND ITS SATELLITE.—In a paper recently published in the *Bulletin Astronomique*, Dr. Nordmann discusses the intrinsic brightness and temperatures of Algol and its satellite by a method depending upon a knowledge of these quantities for the sun, and quite independent of his heterochrome photometer method. In the result, he finds that the surface brightness of Algol is about twenty-six times that of the sun per unit area, and that the effective temperature of the star is about 13800°; by the independent photometric method he found 13300° as the temperature.

While the general failure to detect a secondary minimum in the light-curve of Algol suggests that the satellite only emits a negligible quantity of light, Dr. Nordmann's results indicate that the satellite is not the obscure, cool body it is generally supposed to be, but has an effective temperature and a surface brightness of the same order as those of the sun, to which it is about equal in diameter. The temperature found is equal to, or less than, 5730°, and the magnitude is not greater than 5·5. For the sun he obtained a temperature of 5320°, and for γ Cygni, which Lockyer places in the Polarian class, a stage higher than the Arcturian class which includes the sun, he found 5670° by his photometer method, but he concludes that Algol's satellite has a temperature not very superior to that of γ Cygni. Finally, he shows that, alone, the radiation from Algol would probably suffice to maintain the surface of the satellite turned towards the primary in a state of incandescence.

HALLEY'S COMET.—In a letter to *The Observatory* (No. 434, April) Mr. Keeling directs attention to an apparent brightening of Halley's comet early in March. From November, 1910, to February 5, the comet was becoming fainter, from mag. 14½ to mag. 15½, but on March 4 both the visual and the photographic observations at the Helwan Observatory showed it to be much brighter, smaller, and more sharply defined than during the previous four months. Its magnitude, determined from two plates taken on that date, was 14–14½, but it was half a magnitude fainter again on March 8. The Helwan observations show that throughout the long period it has now been observed during this apparition it has been about a magnitude brighter visually than photographically.

At the last meeting of the Royal Astronomical Society Mr. J. H. Reynolds directed attention to the distinct type of tail emanating from the comet on different dates. The Helwan photographs form a very long, connected series, and from them Mr. Reynolds suggests that the type of tail presented depends upon the distance from the sun rather than upon the size of the comet; when near the sun the tail appears as a prolongation of the envelopes around the nucleus, but when distant it takes the form of streamers radiating from a point directly behind the nucleus. Investigations by Mr. Knox Shaw indicate that at distances from 0·4 to 0·7 the tails are of the extended envelope type, from 0·7 to 0·8 they are of an intermediate type, and above 0·8 they are of the radiating type, such as seen in the case of Morehouse's comet.

A continued ephemeris for the comet is published by Dr. Ebell in No. 4492 of the *Astronomische Nachrichten*.

OBSERVATIONS OF JUPITER.—In the April number of *L'Astronomie* M. Antoniadi describes his observations of Jupiter made at the Barbier, the Meudon, and the Juvisy observatories during 1910. Numerous spots, clouds, and disturbances were seen and are described, and it is remarked that the suggestion, made in 1902, that the Red Spot is pushed forward by the great disturbance which overtakes it periodically, was confirmed by the observations made in July; on July 25 the longitude of the Red Spot was 356° instead of 358°. A splendid drawing in colours is reproduced on a plate accompanying the article.

GEOLOGICAL WORK IN BRITISH LANDS.[1]

II.—IN AUSTRALASIA.

THE Geological Survey of Western Australia suffers, like that of India, from the pecuniary attractions offered by mining companies. It thus lost Mr. Brooking at the end of 1909, but hopes to retain other efficient officers. In the Annual Progress Report for that year (issued in 1910), Mr. H. P. Woodward describes an association of albite and tantalite in pegmatite dykes (p. 17) which recalls the famous dyke with rare black minerals at Ytterby. The albite has been removed in one reef and replaced by quartz, furnishing another point of similarity between the Australian example and those of Swedish isles. The Bulletins recently issued rightly devote much attention to mining interests. We are glad to note that Mr. J. Allan Thomson, lately one of the Rhodes scholars from New Zealand, contributes the petrographical matter to No. 33. He provides, among other points, an interesting discussion on uralitic hornblende (p. 132). The mining memoirs, such as this on the Gascoyne and Pilbara Goldfields, and No. 38 (1910), on the Irwin River Coalfield,

[1] The first article appeared in NATURE of February 23, 1911 (vol. lxxxv., p. 553).

are complete in themselves, with colour-printed maps and sections. The responsibility of one officer for each field bulletin probably aids the rapid production of a series in a single year. Mr. Talbot describes in No. 39 (1910) the country traversed on a water-seeking expedition in the interior, between Wiluna, Hall's Creek, and Tanami. We note the occurrence of obsidianites at one point (p. 29). The descriptions and excellent photographs of the country make the bulletin of geographical value (Fig. 1). Four

FIG. 1.—Jellabra Rock-hole, east of Gardiner Range, on the border of West and South Australia, Devonian Sandstone.

contributors furnish Bulletin 36 (1910), on palæontology, two being English specialists. Dr. G. J. Hinde describes sponge-spicules, the silica of which remains uncrystalline, from a post-Cretaceous rock in the Norseman district. Mr. Newell Arber deals with certain plants, which would determine strata at Mt. Hill and near Mingenew as Jurassic; and Mr. R. Etheridge describes a number of Jurassic marine fossils from the Greenough River district. Mr. L. Glauert, of the Western Australian Survey, compares the jaw and teeth of a new diprotodont species, *Sthenurus occidentalis*, found in stalagmite, with the species known to Owen. He then (p. 71) gives a useful systematic list of Western Australian fossils, which must not be overlooked by stratigraphers and students of distribution. He holds (p. 111) that the occurrence of Devonian beds in his State is confirmed by a review of specimens from the Napier Range, submitted to Dr. Henry Woodward.

Mr. H. Y. L. Brown reported to the South Australian Government in 1910 on the country south and east of the Murray River. The observations of geologists have here shown the existence of old river channels in a rock-floor under marine Tertiary beds; the latter receive water inland at their junction with the older rocks, and provide important reservoirs, through which the fresh water percolates gradually to the sea. Bores in the desert region have been successful. Mr. W. Howchin, of the University of Adelaide, describes two very striking moraines of the Permo-Carboniferous Glacial epoch at Rosetta Head and King's Point, South Australia (Trans. Roy. Soc. South Australia, vol. xxiv., 1910). The great boulders of transported granite appear to weather out as if they were of modern origin, just as they do in South Africa, where denudation has attacked the Dwyka beds (Fig. 2).

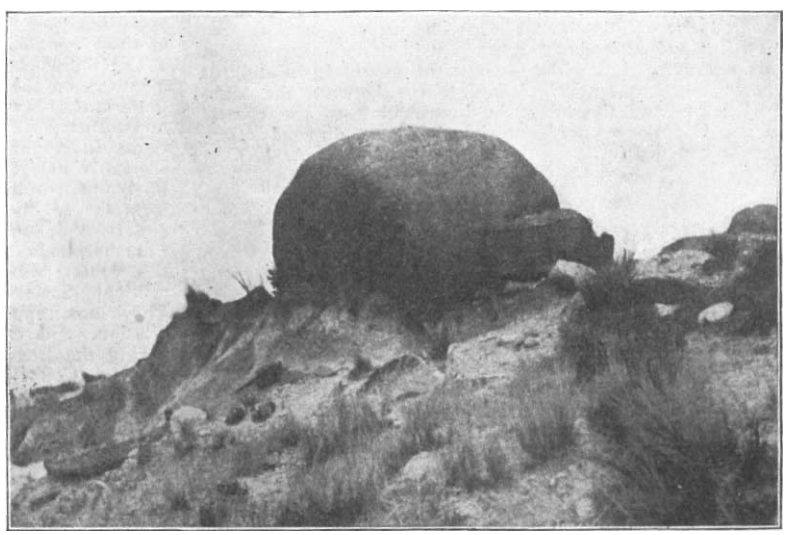

FIG. 2.—Granite erratic resting on Permo-Carboniferous glacial till, Palæozoic moraine of King's Point, South Australia.

The Geological Survey of New South Wales has issued a well-illustrated account of the Murrumbidgee River district, where a storage-reservoir is in progress (Records, 1909, price 7*s.* 6*d.*, with large coloured maps and sections). The author, Mr. L. F. Harper, keeps in view the geological history of the country, and is by no means content with mere description. Messrs. R. Etheridge and W. S. Dun furnish a monograph on Eurydesma in New South Wales (Mem. Geol. Surv. New South Wales, 1910, price 7*s.* 6*d.*). This large Permo-Carboniferous lamellibranch is known only from Australia and from the Indian Salt Range. The authors support Morris, to whom the generic name is due, and differ from Stoliczka, by placing Eurydesma near Avicula. They regard Aucella as its nearest fossil, and Meleagrina, the pearl oyster, as its nearest modern representative. Its stratigraphical and local restriction gives it special interest. Mr. A. R. McCulloch has illustrated the genus by appropriately bold and striking plates.

In Victoria, Prof. Skeats describes the gneisses and dacites of Dandenong, twenty-five miles from Melbourne (Quart. Journ. Geol. Soc. London, 1910, p. 450). The interest lies in the conclusion that the gneissic rocks result from dynamic action on dacites, the product being subsequently altered by contact with a mass of granodiorite. Mr. F. Chapman (Proc. Roy. Soc. Victoria, vol. xxii., 1909, p. 263) has investigated the Batesford Limestone, devoting particular attention to the foraminifera and the ostracods. New species are described, and the rock is regarded as of Middle Cainozoic age. Mr. Chapman, by his continuous and patient work, is carrying out ably for Australia the traditions of Prof. T. Rupert Jones. Mr. R. W. Armitage (*Victorian Naturalist*, vol. xxvii., 1910, p. 21) reviews known cases of the inclusion of plant-remains in lavas, and records the discovery of charred wood in Pliocene basalt near Melbourne. The basalt has intruded minutely into the shrinkage-cracks of the timber, "along the medullary rays and around the annual rings." Mr. Armitage has also guided the Field Naturalists' Club of Victoria to West Essendon (*ibid.*, p. 83), and gives an interesting account of Cainozoic sands converted by percolating waters into quartzite. In discussing the literature of similar cases, he would have been aided by a fuller reference to the modern quartzites formed in arid regions of South Africa.

The Geological Survey of Queensland is naturally concerned principally with mines. Mr. L. C. Ball describes the Starcke Goldfield (Publication No. 223), where the reefs are formed through the replacement of the slaty country-rock by quartz and a triclinic felspar, the alteration spreading inward from fissures due to earth-movement. The occurrence of secondary felspars in similar

veins elsewhere is referred to (p. 14). Mr. Ball also reports on minerals, including tin, mercury, copper, and coal, in North Queensland (No. 222, 1910). The coals of Cooktown are believed to be of early Mesozoic age; but the author refers (p. 37) those of Mount Mulligan to the Palæozoic, on account of the presence of Glossopteris. Mr. Marks describes the coal-measures of Trias-Jura age in south-east Queensland (No. 225), but does not add anything to their palæontology. A large map has been issued 1910), showing the topography of the mineral fields and coal-fields in east central Queensland, on the scale of one inch to four miles.

The Bulletins of the New Zealand Geological Survey continue to maintain their exceptionally high position. Messrs. Bell and Clarke (No. 8, 1909) make us acquainted with the scenery of the Whangaroa district, in the far north of the long promontory of Auckland. The difficulties so often met with in the palæontology of New Zealand appear to crop up here, and, in view of the scarcity of fossils and the uncertainty of those discovered, it is found impossible to divide the Kaeo series into a Mesozoic and a Cainozoic portion, though both are believed to be present. Greensands and "claystones" are its most extensively developed rocks (p. 49). Igneous rocks of Palæozoic (?) to Cainozoic age occur, and are illustrated by thin sections. Mr. J. H. Adams (No. 9, 1910) describes the Whatatutu subdivision in Raukumara, which is also in the North Island. Here satisfactory fossils enable him to place the whole of his beds, the Whatatutu series, in the Upper Miocene, and to reject a previous grouping into Cretaceous and Lower Cainozoic (pp. 12 and 23). Mr. C. Fraser (No. 10) treats of the Thames Goldfield in Hauraki, Auckland, which has suffered from the usual periods of "boom" and consequent depression. The "sensational development," however, of one mine in 1904 shows how irregular vein-mining may prove to be. One of the features of the district is the Table Mountain, formed by the weathering out of a huge dyke of andesite, which penetrated a plateau of easily eroded rhyolite-tuffs. The gold and silver ores began to be imported into the district in early Cainozoic times, and the vein-material partly fills fissures and partly replaces country-rock (p. 41). The "bonanza" deposits are attributed to waters that had acquired different characters meeting at certain points along intersecting veins, and thus promoting deposition. Mr. E. Webb (No. 11) writes on the country in the north of the Westport Division in Nelson. The faults which lowered the highland that once lay to the west of the New Zealand Alps play a great part in the physiography of this region, and the block-system of mountain-building is shown in the retention of fault-scarps between the highland levels and the lower land stretching to the coastal plain. Copper-ores and molybdenite have directed attention to the district. G. A. J. C.

THE PHARMACEUTICAL SOCIETY'S SEVENTIETH ANNIVERSARY.

THE seventieth anniversary of the Pharmaceutical Society of Great Britain, which occurs this month, is an event of some considerable interest, which is not wholly confined to those who practise the art of pharmacy. Since its earliest days the society has devoted its attention to improvements in scientific education, and, indeed, before it was a year old, it had instituted courses of lectures in chemistry, materia medica, pharmacy, and botany. Its foundation dates from April 15, 1841, when at a meeting of chemists and druggists held at the Crown and Anchor Tavern, in the Strand, it was resolved to form an association "for the purpose of protecting the permanent interests and increasing the respectability of chemists and druggists."

At that time there were many men who by their training were well equipped for the work of compounding drugs and dispensing medicines, but owing to their lack of cohesion the science of pharmacy was making very slow progress. The rapid advances which the society made in the commencing years of its existence was in a large measure due to the pervading influence of its first president, William Allen, F.R.S., who, in addition to carrying on the business of a chemist in Plough Court, in the City, was a man with very considerable scientific attainments. In 1796 he had with several other young men formed the Askesian Society for practical scientific research, and three years later he helped to form the British Mineralogical Society, while in 1804 he delivered a course of lectures on natural philosophy at the Royal Institution.

With such a man at the head, there is little wonder that the newly formed Pharmaceutical Society became imbued with his scientific spirit, and turned to education as a means of raising pharmacy from the low level at which it stood as a calling in those days. The Royal Charter of Incorporation was obtained in 1843; therein the purpose of the society is set forth as being for the advancement of chemistry and pharmacy and the promotion of a uniform system of education of those who carry on the business of chemists and druggists. As already stated, the School of Pharmacy was soon established, and in 1845 a laboratory was constructed which compared favourably with the laboratories of Germany, including that of Giessen, and most of those in France. Having instituted a sound system of education and examination, the society was in a position to ask the Government for privileges for its members, but it was not until 1852 that an Act was passed restricting the use of the title of pharmaceutical chemist to examined persons. This Act did not restrict the sale of poisons, and the society had to wait another sixteen years before it obtained from Parliament a measure of legislation by which the retail traffic in poisons was placed in the hands of those who had passed the statutory examinations.

To revert to an earlier period and the efforts made to encourage scientific research, a committee was appointed in 1844, on the recommendation of Dr. Pereira, to investigate the then known materia medica. The committee was composed of several officers and members of the society, together with the professors at the school, and did a considerable amount of useful work, the results of which were communicated to meetings of the society. The evening meetings, held once a month in the autumn and winter, have contributed very largely to the advancement of scientific pharmacy, and the great improvements in the methods of preparation and administration of medicinal compounds which have been effected during the last seventy years have been due in a great measure to the discussions at these meetings.

The influence of the Pharmaceutical Society and its members on the British Pharmacopœia has been extremely important, notwithstanding that the society, as such, has no statutory acknowledgment of its work in this connection. In a paper read in 1845, Peter Squire, who subsequently held the office of president, pointed out the evils likely to result from the discrepancies existing in the formulæ of the Pharmacopœias for England, Scotland, and Ireland, but it was not until 1864 that the first British Pharmacopœia was published. When the preparation of this volume was contemplated, the council of the Pharmaceutical Society, at the request of the College of Physicians, appointed a committee to assist in its compilation, and when a few years later the duty of preparing the Pharmacopœia was transferred to the General Medical Council, the society was requested to keep in touch with that body. In the preparation of subsequent editions the services of pharmacists have been invaluable.

The British Pharmaceutical Conference, although in no way part of the society, largely consists of members of the society, and the parent body has never ceased to encourage the conference in the useful work it has accomplished. *The Pharmaceutical Journal* was founded in 1841 by Jacob Bell, and has been the means of recording and distributing the results of work done in connection with pharmacy and allied sciences. The British Pharmaceutical Codex is another of the society's publications which has contributed to the progress of pharmacy. More recently the society has directed its attention to improving its educational system, which seems to justify the belief that the scientific spirit which imbued its founders has been inherited by those who govern its affairs to-day.